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NEW BEDFORD ENVIRONMENTAL INVESTIGATION-
SAMPLING AND ANALYSIS OF HARBOR BOTTOM
SEDIMENT FOR POLYCHLORINATED
BIPHENYLS (PCBs)

Final Report

Volume 1



GCA CORPORATION
Technology Division

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Bedford, Mass. 01730

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January 1983

GCA CORPORATION
GCA/TECHNOLOGY DIVISION
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SECTION 1

INTRODUCTION

The Environmental Protection Agency is currently conducting a comprehensive evaluation of the occurrences, distribution, transport, and fate of polychlorinated biphenyls (PCBs) and related organic contaminants within the New Bedford area. An integral part of this program is to supplement the existing data base concerning PCB contamination in bottom sediments in the Acushnet River, New Bedford Harbor, and associated regions of Buzzards Bay. GCA/Technology Division in conjunction with the Environmental Protection Agency and staff of Woods Hole Oceanographic Institute and Bridgewater State College designed a sampling program to supplement the existing data base on PCB concentrations in bottom sediments in the New Bedford, Massachusetts region. Sample sites were selected on the basis of both sedimentological data and existing gaps in the available PCB data base. It was anticipated that this comprehensive sampling and analysis effort in conjunction with other available PCB data would provide measurements suitable for eventual incorporation into a contour map profiling PCB contamination in bottom sediments in the New Bedford region. It was further anticipated that the resultant measurements would further define PCB contamination in the study region. As a consequence a comprehensive sampling effort was conducted in early August of 1982 by means of a collaborative effort between GCA/Technology Division, Dr. J. Sulanowski of Bridgewater State College and staff of the Woods Hole Oceanographic Institute. Sixty-six (66) stations were sampled over a region encompassing the Acushnet River Estuary, inner and outer New Bedford Harbor, Clark's Cove and contiguous regions of Buzzard's Bay. Samples were collected at an average rate of 11 stations per day on 6 sampling days; August 3, 4, 5, 6, 11 and 26, 1982.

The locations of the 66 stations sampled are listed as latitude/longitude coordinates in Section 2. In addition, these locations are shown in the site schematic provided as Attachment A.

Sampling protocols, as outlined in Section 2, consisted of the use of a Van Veen type grab sampler, which generally provided an 8 cm vertical grab sample of the bottom surface. Samples were subdivided to represent upper (0-4 cm) and lower (4-8 cm) surfaces, and transported to the GCA laboratory in Bedford, Mass.

Samples collected from stations numbered 1 through 57 were submitted to Versar, Inc., Springfield, Virginia for PCB analysis. Duplicate aliquots of selected samples from stations 1 through 57 were analyzed at the GCA laboratory in Bedford, Massachusetts. Also analyzed at GCA were samples from

stations 58 through 66. Section 3 outlines the analytical protocols used by Versar Inc. and GCA/Technology, respectively, to obtain PCB measurements on the samples. Analyses proceeded in accordance with accepted reference protocols. PCB measurements were provided in all cases using a gas chromatograph fitted with a Ni⁶³ electron capture detector (GC/ECD).

PCB measurements, from all stations sampled, are presented in Section 5. All data are reported on a dry weight basis, as determined by percent moisture measurements.

Section 4 presents all quality control data specifically generated for this program. This includes results of analysis of all "blind" spikes, duplicates and blank samples submitted to Versar Inc. The results of GCA laboratory control spikes and method blanks are also provided.

SECTION 2

SAMPLING PROTOCOLS

INTRODUCTION

The collection of bottom sediment samples from 66 stations was coordinated by GCA/Technology Division during early August 1982. The stations sampled included the Acushnet River Estuary, Clark's Cove and selected sites from the inner and outer sections of New Bedford Harbor.

SAMPLE CONTAINER PREPARATION

Prior to sampling, 9 oz glass sample containers were rinsed successively in methanol, acetone, toluene and pentane.

SAMPLE COLLECTION

Bottom sediment samples as collected from 66 stations are listed with coordinates in Table 1. A map, siting the stations at their approximate geographic locations is provided as Attachment A. Field personnel designations for each of six sampling dates are noted in Table 2.

A 13-foot Boston Whaler was used for sampling efforts in shallow waters, and the Woods Hole Oceanographic Institute research vessel "Asterias" was used in deeper waters. All bottom sediments were collected using the Van Veen grab sampler pictured in Figure 1. This sampler, fabricated from heavy-gauge steel, is designed for sediment sampling in coastal waters. Closure of the sampling compartment jaws is automatic when the lowering rope slackens upon contact with the bottom surface. The jaws sample a surface area of 0.042 m^2 with a 10 cm vertical capacity and a sampler compartment capacity of 4 liters. Each jaw is fitted with a hinged lid which facilitates sample removal.

Sediment samples collected for this program were subdivided by depth, at the collection station, by transferring two separate sample portions from the upper 8 cm (0-4 and 4-8 cm) to precleaned sample containers. At some stations, where excess shells, stones or vegetation interfered with completely filling the sampler compartment with sediment, only a 0-4 cm sample was collected. Between stations, the sampler was rinsed with seawater. Samples were transferred using broad stainless steel spatulas which had also been rinsed with seawater. Table 1 lists the samples collected at each station.

TABLE 1. BOTTOM SEDIMENT SAMPLES COLLECTED

Sampling date	Station No. ^a	Latitude ^b	Longitude ^b	Depth ^c (cm)	GCA No. ^d
08/03/82	1	41°39.97'	70°55.13'	0-4	24155
				4-8	24156
	2	41°39.97'	70°55.03'	0-4	24157
				4-8	24158
	3	41°39.97'	70°55.00'	0-4	24160
				4-8	24161
	4	41°39.55'	70°55.17'	0-4	24162
				4-8	24163
	5	41°39.40'	70°55.03'	0-4	24164
				4-8	24165
	6	41°39.37'	70°54.97'	0-4	24167
				4-8	24168
	7	41°39.28'	70°54.93'	0-4	24169
				4-8	24170
	8	41°39.32'	70°55.13'	0-4	24172
				4-8	24173
	9	41°39.17'	70°55.17'	0-4	24174
				4-8	24175
08/04/82	10	41°38.97'	70°55.10'	0-4	24176
				4-8	24177
	11	41°38.92'	70°54.97'	0-4	24179
				4-8	24180
	12	41°38.83'	70°54.88'	0-4	24181
				4-8	24182
	13	41°38.75'	70°54.75'	0-4	24184
				4-8	24185
	14	41°38.57'	70°54.70'	0-4	24186
				4-8	24187

(continued)

TABLE 1 (continued)

Sampling date	Station No. ^a	Latitude ^b	Longitude ^b	Depth ^c (cm)	GCA No. ^d
08/04/82 (cont)	15	41°38.30'	70°54.65'	0-4 4-8	24188 24189
	16	41°38.40'	70°55.12'	0-4 4-8	24191 24192
	17	41°38.28'	70°55.28'	0-4 4-8	24193 24194
	18	41°38.23'	70°55.13'	0-4 4-8	24196 24197
	19	41°38.17'	70°55.17'	0-4 4-8	24198 24199
	20	41°38.07'	70°55.05'	0-4 4-8	24200 24201
	21	41°38.12'	70°54.88'	0-4 4-8	24203 24204
	22	41°38.42'	70°54.67'	0-4 4-8	24205 24206
08/05/82	23	41°37.23'	70°53.62'	0-4 4-8	24208 24209
	24	41°37.43'	70°54.33'	0-4 4-8	24210 e
	25	41°37.50'	70°54.47'	0-4 4-8	24211 24212
	26	41°37.65'	70°54.43'	0-4 4-8	24213 24214
	27	41°37.37'	70°54.70'	0-4 4-8	24216 24217
	28	41°37.88'	70°54.72'	0-4 4-8	24218 24219

(continued)

TABLE 1 (continued)

Sampling date	Station No. ^a	Latitude ^b	Longitude ^b	Depth ^c (cm)	GGA No. ^d
08/05/82 (cont)	29	41°38.90'	70°55.02'	0-4 4-8	24221 24222
	30	41°38.00'	70°54.78'	0-4 4-8	24223 24224
	31	41°38.07'	70°54.68'	0-4 4-8	24225 24226
08/06/82	32	41°35.77'	70°53.78'	0-4 4-8	24228 24229
	33	41°35.53'	70°54.90'	0-4 4-8	24230 e
	34	41°36.37'	70°55.20'	0-4 4-8	24231 24232
	35	41°36.70'	70°55.42'	0-4 4-8	24234 24235
	36	41°36.73'	70°55.75'	0-4 4-8	24236 24237
	37	41°35.42'	70°55.60'	0-4 4-8	24238 e
	38	41°35.20'	70°55.75'	0-4 4-8	24240 24241
08/11/82	39	41°33.91'	70°46.45'	0-4 4-8	24242 24243
	40	41°34.87'	70°47.40'	0-4 4-8	24245 24246
	41	41°35.35'	70°46.67'	0-4 4-8	24247 24248
	42	41°36.18'	70°47.13'	0-4 4-8	24249 24250

(continued)

TABLE 1 (continued)

Sampling date	Station No. ^a	Latitude ^b	Longitude ^b	Depth ^c (cm)	GGA No. ^d
08/11/82 (cont)	43	41°37.04'	70°47.60'	0-4 4-8	24252 24253
	44	41°36.63'	70°48.53'	0-4 4-8	24254 24255
	45	41°35.70'	70°47.96'	0-4 4-8	24257 24258
	46	41°34.02'	70°48.60'	0-4 4-8	24259 24260
	47	41°33.23'	70°47.84'	0-4 4-8	24261 24262
	48	41°33.49'	70°49.69'	0-4 4-8	24264 24265
	49	41°33.27'	70°51.16'	0-4 4-8	24266 24267
	50	41°33.80'	70°52.13'	0-4 4-8	24269 24270
	51	41°34.70'	70°52.88'	0-4 4-8	24271 24272
	52	41°34.67'	70°55.95'	0-4 4-8	24273 24274
	53	41°34.16'	70°55.49'	0-4 4-8	24276 24277
	54	41°33.04'	70°54.77'	0-4 4-8	24278 24279
	55	41°32.89'	70°54.35'	0-4 4-8	24280 24281
	56	41°35.90'	70°53.62'	0-4 4-8	24282 24283

(continued)

TABLE 1 (continued)

Sampling date	Station No. ^a	Latitude ^b	Longitude ^b	Depth ^c (cm)	GCA No. ^d
08/11/82 (cont)	57	41°36.65'	70°53.94'	0-4 4-8	24284 24285
08/26/82	58	41°35.96'	70°52.60'	0-4 4-8	27217 e
	59	41°35.92'	70°52.31'	0-4 4-8	27218 e
	60	41°36.40'	70°52.61'	0-4 4-8	27219 27220
	61	41°36.52'	70°52.27'	0-4 4-8	27221 e
	62	41°37.48'	70°52.97'	0-4 4-8	27222 e
	63	41°37.47'	70°52.49'	0-4 4-8	27223 e
	64	41°34.50'	70°49.18'	0-4 4-8	27224 e
	65	41°34.29'	70°49.61'	0-4 4-8	27225 e
	66	41°34.02'	70°50.19'	0-4 4-8	27226 e

^aCorresponds to Station No. provided on GCA contour map.

^bBearings for Stations 1 through 38 taken with hand compass on permanent local features noted on topographic maps and navigational charts. Bearings for Stations 39 through 66 taken using Lorcan fixes.

^cDenotes subsamples provided by Van Veen grab sampler at each station.

^dSample identification assigned from GCA Master Log Book upon receipt at GCA Sample Bank.

^eNo subsample collected from this depth; Van Veen sampler resurfaced partially filled due to bottom conditions not optimum for sampling.

TABLE 2. SAMPLE COLLECTION DATES/FIELD PERSONNEL

Sampling date(s)	Sampling personnel	Affiliation
8/03-08/06/82	P. Ford	GCA
	J. Sulanowski	Private subcontractor to GCA
	D. DeLorenzo	Private subcontractor to GCA
8/11/82	P. Ford	GCA
	B. Tripp	Woods Hole Oceanographic Institute
	H. Clifford	Woods Hole Oceanographic Institute
8/26/82	B. Tripp	Woods Hole Oceanographic Institute
	H. Clifford	Woods Hole Oceanographic Institute

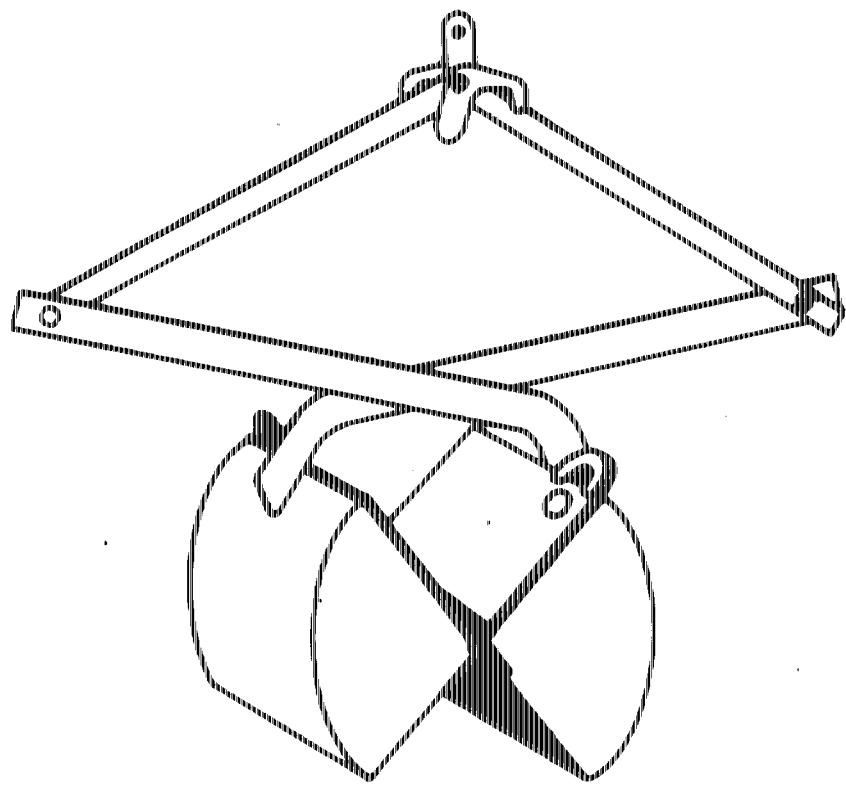


Figure 1. Van Veen Grab Sampler.

CHAIN OF CUSTODY

After samples had been collected and labeled for identification, they were entered in the project field log and on chain-of-custody records. Samples locked in coolers were maintained at less than 4°C at the Woods Hole Oceanographic Institute prior to transfer to the GCA Laboratory.

SECTION 3

ANALYTICAL PROTOCOLS

INTRODUCTION

Sediment samples collected from 66 stations were analyzed by Versar Inc. and/or GCA/Technology Division for PCB content. Procedures used to document chain of custody and to perform PCB analyses are presented below.

SAMPLE BANK RECEIPT AND CHAIN OF CUSTODY

A total of 121 sediment samples were received at the GCA/Technology Division Sample Bank during August and October 1982. The samples, accompanied by chain of custody documentation, were submitted as follows:

<u>Date of receipt</u>	<u>Number of samples</u>
August 9	73
August 13	38
October 4	10

Routine inspection upon receipt of each set revealed all samples to be in good condition, securely tagged, and appropriately chilled. Careful comparison of the sample tags with the chain of custody records verified sample identification. These records were signed by Sample Bank personnel and placed in the permanent project file. The samples were then entered in the Master Log Book where each individual sample was assigned a GCA Control Number. This unique identification was affixed to the respective sample containers and subsequently used throughout the laboratory analysis procedures for positive traceability. Table 1 in Section 2 contains the complete list of samples received and their corresponding assigned GCA Control Numbers.

Chain of custody procedures were maintained in the laboratory through the use of GCA Custody Notebooks. At the time of receipt, a page for each sample was entered sequentially by GCA Control Number in the Custody Notebook, and the samples were transferred to the locked Sample Bank for storage at 4°C until the time of analysis. Subsequent handling of the samples was documented by the recording of signatures and dates in the Custody Notebook. In addition, the transfer of samples or extracts between analysts within the laboratory was documented on Sample Custody Transfer forms which become part of the permanent project file and serve as a supplement to the Custody Notebook record of sample handling.

The transfer of samples from GCA/Technology Division to Versar Inc., Springfield, Virginia, was documented on the appropriate custody notebook pages and on custody forms prepared at GCA. These forms accompanied the samples during shipment, were signed by receiving personnel, and were returned to the GCA Sample Bank for entry in the project file.

SAMPLE PREPARATION AND ANALYSIS

Versar, Inc.

Sample Preparation^{1,2}--

Sediment samples were homogenized and aliquotted into two representative 20.0 gram portions. One aliquot was added to 50 ml of acetone: hexane (1:1) in a stoppered 250 ml erlemeyer flask. The flask was then placed on a mechanical shaker. After 30 minutes, the extract was decanted through sodium sulfate and an aliquot cleaned up via florisil chromatography. The other aliquot was air-dried to determine the dry weight of the extracted portion.

Sample Quantitation--

Sediment extracts were analyzed for PCB using the instrumental operating conditions described in Reference 3. Aroclor identification was based on a comparison of sample response pattern with those of Aroclor standards. Quantitation was performed by comparing the summed integrated areas of samples with a 3-point standard calibration curve. Samples which resembled but did not strictly match an Aroclor pattern were analyzed using the method of Webb and McCall.⁴

GCA/Technology

Sample Preparation--

From each of the sediment samples, a representative aliquot was removed for determination of moisture content according to procedures outlined in Reference 5. Weighed portions of air-dried sediment were subsequently dried for 16 hours at 103°C and reweighed to obtain the oven-dry weight which is then applied to correct the extracted weight of the sample. The sediment samples were prepared for PCB analysis according to the procedures specified in Reference 5. Aliquots of wet sediment were removed from the samples, air dried in a fume hood, and subsequently weighed into glass thimbles for soxhlet extraction. Calculated dry weights of these extracted sediment aliquots were approximately 5 grams. A 16-hour extraction was performed using 1:1 hexane:acetone solvent. The solvent extract was then concentrated to 10.0 ml via rotary evaporation (40°C). To reduce matrix interferences, the sample extracts were subjected to florisil column chromatography,³ followed by a sulfuric acid partitioning.⁶

Sample Quantitation--

Sample extracts were analyzed for PCB using a Hewlett-Packard 5840A with a Ni⁶³ electron capture detector and HP 7671A automatic sampler. The instrumental operating parameters are listed in Reference 3. Aroclor identification was accomplished by pattern matching techniques. Instrument calibration was accomplished using dilutions of Aroclor standard reference material from the reference repository at EPA/RTP. Four-point calibration

curves were constructed by performing a linear regression analysis on the 5-peak summation of detector response versus the concentrations of the standard mixture. The correlation coefficient on all calibration curves was greater than 0.999. The summed detector response to samples was entered into the appropriate calibration curve in order to determine Aroclor content.

SECTION 4

QUALITY CONTROL

The quality control protocol for this project included the analysis of "blind" QC samples, both spikes and duplicates, laboratory control samples and laboratory method blanks. Reported values for the method blank analyses were all less than 0.10/ μ g. Results of analyses of replicates, spikes, and laboratory control samples are presented in this section.

REPLICATE ANALYSES

Fifteen "blind" duplicate aliquots of samples submitted to Versar, Inc. were relabeled at GCA with new GCA Control Numbers and included with the sample shipment. Thus, their identity as replicates was not known to Versar personnel. Eight of the duplicates were selected from areas suspected of containing PCB residues and seven from areas suspected of having low or undetectable PCB residues. Additionally, 14 duplicate aliquots of samples analyzed by Versar, Inc. were also analyzed by GCA/Technology. These samples were selected after PCB results were submitted to EPA by Versar.

In accordance with the previous approach for replicate analysis, approximately 50 percent of the replicate samples analyzed by GCA were those reported as containing measureable PCB residues. The remaining 50 percent were selected from samples reported as "contaminant free" with respect to PCB residues. The results from Versar and GCA analysis of replicate samples are presented in Table 3.

"BLIND" SAMPLES

Four "blind" samples were submitted to Versar, Inc. along with the program samples. Three of these were EPA/EMSL reference materials (WP 978, PCBs in Sediment), which were aliquotted and dampened with organic free laboratory water to simulate the appearance of program samples. The fourth was a sediment sample which had previously been analyzed by GCA and found to contain <0.5 mg/kg of PCB. The reference materials and uncontaminated sediment were coded in the same manner as actual samples and assigned GCA numbers. The results reported by Versar, Inc. for the above samples are shown in Table 4. A review of reported QC data was performed by personnel at the EPA Region I---NERL in Lexington, MA. The data were found to be within the 95 percent confidence level and approved for release.

TABLE 3. RESULTS OF ANALYSIS OF DUPLICATE SEDIMENT ALIQUOTS

First aliquot (analyzed by Versar Inc.)			Duplicate aliquot ^a			
GCA No.	Aroclor found	Concen- tration ^b (mg/kg)	GCA No.	Aroclor found	Concen- tration ^b (mg/kg)	Analyzing laboratory
24155	1248	18	24171	1248	11	Versar
24157	1248	280	24157	1242/1016 ^c 1254	290 160	GCA GCA
24158	1248	360	24207	1248 & 1254	360	Versar
24160	1248	860	24163	1242	1,200	Versar
24161	1248	840	24161	1242/1016 ^c 1254	280 280	GCA GCA
24162	1248	270	24162	1242/1016 ^c 1254	700 130	GCA GCA
24163	1248	250	24220	1248	240	Versar
24164	1248	100	24251	1248 & 1254	150	Versar
24167	1248	240	24167	1242/1016 ^c 1254	230 100	GCA GCA
24168	1248 & 1260	590	24239	1248	520	Versar
24169	1248 & 1260	99	24268	1248 & 1254	120	Versar
24173	1248	33	24166	1248	25	Versar
24180	1248 & 1254	6	24180	1242/1016 ^c 1254	1.6 1.6	GCA GCA
24185	1248 & 1254	170	24185	1242/1016 ^c 1254	77 120	GCA GCA
24198	1248 & 1254	23	24198	1242/1016 ^c 1254	21 13	GCA GCA

(continued)

TABLE 3 (continued)

First aliquot (analyzed by Versar Inc.)			Duplicate aliquot ^a			
GCA No.	Aroclor found	Concen- tration ^b (mg/kg)	GCA No.	Aroclor found	Concen- tration ^b (mg/kg)	Analyzing laboratory
24208		<1	24208		<1	GCA
24214		<1	24214		<1	GCA
24229	1248 & 1254	<1	24229	1242/1016 ^c 1254	8.3 9.0	GCA GCA
24249		<1	24159		<1	Versar
24253		<1	24275		<1	Versar
24255		<1	24255		<1	GCA
24261		<1	24227		<1	Versar
24267		<1	24195		<1	Versar
24270		<1	24256		<1	Versar
24272	1254	4	24272	1242/1016 ^c 1254	1.1 1.3	GCA GCA
24277		<1	24202		<1	Versar
24278		<1	24233		<1	Versar
24280		<1	24280		<1	GCA
24285	1248 & 1254	20	24285	1242/1016 ^c 1254	7.7 6.5	GCA GCA

^aDuplicate sample aliquots sent to Versar were assigned a new GCA No.^bAll values reported on a dry weight basis.^cAroclors 1242 and/or 1016 identified; quantitation based on Aroclor 1242. See Section 5.

TABLE 4. VERSAR ANALYSIS OF "BLIND" SAMPLES

GCA No.	Sample Identification	Reported		Expected		95% Confidence interval
		Aroclor	Concentration (mg/kg)	Aroclor	Concentration (mg/kg)	
24215 (SAS No. 61)	Blank ^a	1248	2	-	-	-
24190 (SAS No. 36)	EPA Group 1 ^b	1242	27	1242	24.6	MDL ^c -51.6
24244 (SAS No. 90)	EPA Group 2 ^b	1254	4	1254	2.34	MDL ^c -5.37
24178 (SAS No. 24)	EPA Group 3 ^b	1248	6 ^d	1242 1254	7.83 6.48	2.47-13.2 3.74-9.22
				TOTAL PCB	14.3	6.2 - 22.4

^aThe blank consisted of a sediment sample which had been previously analyzed by GCA and found to contain <0.5 mg/kg PCB.

^bEPA PCBs in Sediment Quality Control Samples--WP978, Environmental Monitoring and Support Laboratory, Cincinnati, OH.

^cMDL = Minimum Detection Limit for a given method and/or instrument

^dThis value falls within the 95% confidence interval since only one significant figure was reported at this level.

LABORATORY CONTROL SAMPLES---GCA

In order to provide some measure of the analytical precision and accuracy of the GCA analytical measurements, a sample of EPA/EMSL Reference Material for PCBs in Sediment (WP 978, Group 1) was included with each group of samples processed. The resulting cumulative data are presented in Table 5. In addition, a single sample of EPA/EMSL WP 978, Group 3 was inserted as an additional laboratory control sample; the results of this analysis are shown in Table 6. It should be noted that the Aroclor identity and corresponding concentrations were unknown to the analyst at the time of analysis.

TABLE 5. GCA CUMULATIVE DATA FOR THE ANALYSIS OF AROCLOR 1242 IN SEDIMENT

Sample identification	Expected Concentration (mg/kg)	Reported (mg/kg) Concentration						Relative standard deviation (%)	Average recovery (%)	
		QC	QC	QC	QC	QC	\bar{x}			
EPA Group 1 ^a	24.6	27	22	21	22	20	22	2.7	12	89

^aEPA PCBs in Sediment quality control sample--WP978, Environmental Monitoring and Support Laboratory, Cincinnati, OH.

TABLE 6. GCA ANALYSIS OF LABORATORY CONTROL SAMPLE
RECEIVED

Sample identification	Reported (% OF AMOUNT ADDED)		Expected		Recovery (%)
	Aroclor	Concentration (mg/kg)	Aroclor	Concentration (mg/kg)	
QC 127 (EPA Group 3) ^a	1242	8.7	1242	7.83	110
	1254	8.5	1254	6.48	130

^aEPA PCBs in Sediment quality control sample--WP978, Environmental Monitoring and Support Laboratory, Cincinnati, OH.

SECTION 5

RESULTS OF ANALYSIS

Results of the PCB analysis conducted on the 121 submitted sediment samples are presented on Table 7. The geographical location of each sampling station is identified by coordinates of latitude and longitude. The approximate station location can be found on the site schematic provided as Attachment A.

As previously mentioned, samples from Stations 1 through 57 were analyzed by Varsar, Inc. Samples from the remaining stations were analyzed by GCA/Technology. All reported values are based on the dry weight of sediment analyzed.

As noted in Table 7, analyses performed at GCA/Technology identified Aroclors 1242 and/or 1016 and Aroclor 1254 as present in several program samples. These samples exhibited an electron-capturing interference in the region of the chromatographic pattern which is essential for discrimination between Aroclors 1242 and 1016. As a result, absolute differentiation between the two Aroclors is not possible. Quantitation of PCB content in this chromatographic region is based on the response of Aroclor 1242. The quantitation of Aroclor 1254 was not affected by these interferences.

TABLE 7. PCB ANALYSIS RESULTS FOR SEDIMENT SAMPLES^a

Station No. ^b	Latitude	Longitude	Depth (cm)	GCA No.	Aroclor found	Concentration ^c (mg/kg)
1	41°39.97'	70°55.13'	0-4	24155	1248	18
			4-8	24156	1248	16
2	41°39.97'	70°55.03'	0-4	24157	1248	280
			4-8	24158	1248	360
3	41°39.97'	70°55.00'	0-4	24160	1248	860
			4-8	24161	1248	840
4	41°39.55'	70°55.17'	0-4	24162	1248	270
			4-8	24163	1248	250
5	41°39.40'	70°55.03'	0-4	24164	1248	100
			4-8	24165	1248	66
6	41°39.37'	70°54.97'	0-4	24167	1248	240
			4-8	24168	1248 & 1260	590
7	41°39.28'	70°54.93'	0-4	24169	1248 & 1260	99
			4-8	24170	1248	56
8	41°39.32'	70°55.13'	0-4	24172	1248	36
			4-8	24173	1248	33
9	41°39.17'	70°55.17'	0-4	24174	1248	20
			4-8	24175	1248	18
10	41°38.97'	70°55.10'	0-4	24176	1248	60
			4-8	24177	1248	53
11	41°38.92'	70°54.97'	0-4	24179	1248	1
			4-8	24180	1248 & 1254	6
12	41°38.83'	70°54.88'	0-4	24181	1248 & 1254	64
			4-8	24182	1248 & 1254	77
13	41°38.75'	70°54.75'	0-4	24184	1248 & 1254	130
			4-8	24185	1248 & 1254	170
14	41°38.57'	70°54.70'	0-4	24186	1248 & 1254	8
			4-8	24187	1248 & 1254	8

(continued)

TABLE 7 (continued)

Station No. ^b	Latitude	Longitude	Depth (cm)	GCA No.	Aroclor found	Concentration ^c (mg/kg)
15	41°38.30'	70°54.65'	0-4	24188	1248 & 1254	24
			4-8	24189	1248 & 1254	43
16	41°38.40'	70°55.12'	0-4	24191	1248 & 1254	35
			4-8	24192	1248	25
17	41°38.28'	70°55.28'	0-4	24193	1248 & 1254	45
			4-8	24194	1248 & 1254	53
18	41°38.23'	70°55.13'	0-4	24196	1248 & 1254	15
			4-8	24197	1248 & 1254	15
19	41°38.17'	70°55.17'	0-4	24198	1248 & 1254	23
			4-8	24199	1248 & 1254	33
20	41°38.07'	70°55.05'	0-4	24200	1248 & 1254	40
			4-8	24201	1248 & 1254	40
21	41°38.12'	70°54.88'	0-4	24203	1248	28
			4-8	24204	1248 & 1254	45
22	41°38.42'	70°54.67'	0-4	24205	1248 & 1254	56
			4-8	24206	1248 & 1254	60
23	41°37.23'	70°53.62'	0-4	24208		<1
			4-8	24209		<1
24	41°37.43'	70°54.33'	0-4	24210		<1
			4-8	d		
25	41°37.50'	70°54.47'	0-4	24211	1248 & 1254	20
			4-8	24212	1248 & 1254	26
26	41°37.65'	70°54.43'	0-4	24213		<1
			4-8	24214		<1
27	41°37.37'	70°54.70'	0-4	24216	1248 & 1254	34
			4-8	24217	1248 & 1254	35
28	41°37.88'	70°54.72'	0-4	24218	1248 & 1254	26
			4-8	24219	1248 & 1254	32

(continued)

TABLE 7 (continued)

Station No. ^b	Latitude	Longitude	Depth (cm)	GGA No.	Aroclor found	Concentration ^c (mg/kg)
29	41°38.90'	70°55.02'	0-4	24221	1,248 & 1,254	26
			4-8	24222	1,248 & 1,254	28
30	41°38.00'	70°54.78'	0-4	24223	1,248 & 1,254	29
			4-8	24224	1,248 & 1,254	24
31	41°38.07'	70°54.68'	0-4	24225	1,248 & 1,254	20
			4-8	24226	1,248 & 1,254	20
32	41°35.77'	70°53.78'	0-4	24228	1,248	98
			4-8	24229	1,248 & 1,254	10
33	41°35.53'	70°54.90'	0-4	24230		<1
			4-8	d		
34	41°36.37'	70°55.20'	0-4	24231	1,248 & 1,254	6
			4-8	24232	1,254	5
35	41°36.70'	70°55.42'	0-4	24234	1,254	5
			4-8	24235	1,254	4
36	41°36.73'	70°55.75'	0-4	24236	1,254	8
			4-8	24237		<1
37	41°35.42'	70°55.60'	0-4	24238		<1
			4-8	d		
38	41°35.20'	70°55.75'	0-4	24240		<1
			4-8	24241		<1
39	41°33.91'	70°46.45'	0-4	24242		<1
			4-8	24243		<1
40	41°34.87'	70°47.40'	0-4	24245		<1
			4-8	24246		<1
41	41°35.35'	70°46.67'	0-4	24247		<1
			4-8	24248		<1
42	41°36.18'	70°47.13'	0-4	24249		<1
			4-8	24250		<1

(continued)

TABLE 7 (continued)

Station No. ^b	Latitude	Longitude	Depth (cm)	GCA No.	Aroclor found	Concentration ^c (mg/kg)
43	41°37.04'	70°47.60'	0-4	24252		<1
			4-8	24253		<1
44	41°36.63'	70°48.53'	0-4	24254		<1
			4-8	24255		<1
45	41°35.70'	70°47.96'	0-4	24257		<1
			4-8	24258		<1
46	41°34.02'	70°48.60'	0-4	24259		<1
			4-8	24260		<1
47	41°33.23'	70°47.84'	0-4	24261		<1
			4-8	24262		<1
48	41°33.49'	70°49.69'	0-4	24264		<1
			4-8	24265		<1
49	41°33.27'	70°51.16'	0-4	24266		<1
			4-8	24267		<1
50	41°33.80'	70°52.13'	0-4	24269		<1
			4-8	24270		<1
51	41°34.70'	70°52.88'	0-4	24271	1242	5
			4-8	24272	1254	4
52	41°34.67'	70°55.95'	0-4	24273	1254	5
			4-8	24274	1254	5
53	41°34.16'	70°55.49'	0-4	24276		<1
			4-8	24277		<1
54	41°33.04'	70°54.77'	0-4	24278		<1
			4-8	24279		<1
55	41°32.89'	70°54.35'	0-4	24280		<1
			4-8	24281		<1
56	41°35.90'	70°53.62'	0-4	24282	1254	8
			4-8	24283	1254	6

(continued)

TABLE 7 (continued)

Station No. ^b	Latitude	Longitude	Depth (cm)	GCA No.	Aroclor found	Concentration ^c (mg/kg)
57	41°36.65'	70°53.94'	0-4	24284	1254	.5
			4-8	24285	1248 & 1254	20
58	41°35.96'	70°52.60'	0-4	27217		<1
			4-8	d		
59	41°35.92'	70°52.31'	0-4	27218		<1
			4-8	d		
60	41°36.40'	70°52.61'	0-4	27219	1254	1.7
			4-8	27220		<1
61	41°36.52'	70°52.27'	0-4	27221		<1
			4-8	d		
62	41°37.48'	70°52.97'	0-4	27222	1242/1016 ^e	2.4
			4-8	d	1254	2.1
63	41°37.47'	70°52.49'	0-4	27223		<1
			4-8	d		
64	41°34.50'	70°49.18'	0-4	27224		<1
			4-8	d		
65	41°34.29'	70°49.61'	0-4	27225		<1
			4-8	d		
66	41°34.02'	70°50.19'	0-4	27226		<1
			4-8	d		

^aSamples from Stations 1 through 57 analyzed by Versar Inc.

Samples from Stations 58 through 66 analyzed by GCA/Technology Division.

^bCorresponds to Station No. provided on GCA contour map.^cAll values reported on a dry weight basis.^dNo subsample collected from this depth; Van Veen sampler resurfaced partially filled due to bottom conditions not optimum for sampling.^eAroclors 1242 and/or 1016 identified; quantitation is based on Aroclor 1242. See text.

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Map at 1510
Row. 901



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GENERALIZED TEXTURAL CHARACTERISTICS OF BOTTOM SEDIMENTS
OF THE NEW BEDFORD HARBOR AREA

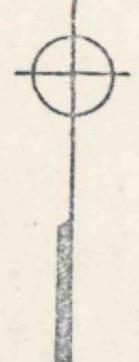
(GCA Report No. TR-83-42-G(2))

KEY:

- ◊ - GCA SITES
- SANDY SILTS
- SILTY FINE SANDS
- CLAY
- GRAVELLY FINE SANDS
- GRAVELLY SANDS
- FINE SANDS

0 2000 4000 6000 feet
SCALE

N



ACUSHNET

AEROVOX

NEW BEDFORD

FAIRHAVEN

MATTAPoisETT

MATTAPoisETT
HARBOR

SCONTICUT
NECK

NASKETUCKET
BAY

WEST
ISLAND

NEW BEDFORD
SEWAGE SLUDGE
INCINERATOR

RICKETSONS
POINT

ROUND
HILL
POINT

CORNELL-DUBILIER

CLARK
POINT

BUZZARD'S

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NEW BEDFORD ENVIRONMENTAL INVESTIGATION -
SAMPLING LOCATIONS OF HARBOR BOTTOM SEDIMENTS SELECTED
FOR HYDRODYNAMIC GRAIN SITE MEASUREMENTS

(GCA Report No. TR-83-42-G(2))

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